



June
'12

RESEARCH TRACKS

A publication of the Office of the Vice Provost for Research
Volume IX, Issue 4

Engineering research seeks to replicate natural behaviors

Dr. Robert Marks, Distinguished Professor of Electrical and Computer Engineering, recently received a grant from the Office of Naval Research to support his work on the behavior of swarms.

Swarm behavior is commonly observed in the natural world, where insects like ants, bees and termites are able to build intricate structures without any central control or supervision. While it might seem that the tiny creatures are exhibiting highly intelligent behavior, Dr. Marks says the behavior is actually driven by simple rules governing the action of individual insects. Taken together, these rules result in emergent, and often unexpected behaviors.

To illustrate the way simple rules can influence swarm behavior, Dr. Marks asks students in his classes to look around the room and randomly choose two other students, then challenges the class to predict what will happen when everyone stands up and takes slow steps to position themselves between the two others. The answer, that students end up clustered in the center of the room, isn't readily apparent.

While this example shows the challenge of predicting behaviors based on rules, Dr. Marks says the inverse

problem — beginning with a desired swarm behavior and crafting rules that will produce it — is even more difficult.

"We use computer simulations to devise swarms and set them in motion," he said, "then see which rules get closest to the behavior we want. Then we can repopulate the swarms that work best and make slight modifications so the fitness of the behavior gets better and better."

Swarm behavior has implications in a variety of areas, from logistics to communication to military applications.

In his current project, Dr. Marks will work with graduate student Jon Roach and Dr. Benjamin Thompson, a Baylor alumnus (B.S. '00) currently working as a research associate and heading a department in the Applied Research Lab at Penn State University. They'll seek to design swarms that mimic another behavior found in nature — agents' changing roles in response to outside stimuli.

"If an ant colony is attacked, worker ants become soldier ants," he said. "When a bee finds flowers, it returns to the hive and does a dance to recruit other bees to accompany it back to harvest the flowers. We are looking at ways to use this property in the design of swarms."

Baylor professor earns fellowship for ethics research

Dr. Robert Roberts, Distinguished Professor of Ethics, has been awarded the Alvin Plantinga Fellowship to pursue research and writing at the Center for Philosophy of Religion at the University of Notre Dame.

The Plantinga Fellowship, one of four fellowships awarded annually by the center, provides time for writing and reflection to individuals working on the forefront of Christian philosophy and the philosophy of religion.

Fellows at the center participate in discussion groups, seminars and conferences on the Notre Dame campus, as

well as lectures and debates for both scholarly and popular audiences.

Dr. Roberts' fellowship will support his research on ethics, virtue and emotions, including his current project, *Emotions and Virtues: An Essay in Moral Psychology*.

The Center for Philosophy of Religion promotes scholarship on philosophical theology and encourages the development and exploration of Christian and theistic philosophy.

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FOR RESEARCH

OVPR website provides assistance in seeking, applying for research funding

The “Research Funding” section of the OVPR website provides faculty with assistance in seeking external funding for their research and scholarly activities. The site provides guidance for every step in the process, from finding opportunities to developing proposals and submitting applications.

Finding funding

The funding section includes information on internal and external sources of funding in a variety of disciplines. Opportunities are ordered by topic area and each listing includes a brief synopsis and a link to the full announcement on the sponsor’s website.

The site also includes a link to [COS Pivot](#), an online database of funding opportunities. The OVPR provides a campus-wide subscription to the service, which indexes funding opportunities from a variety of sources including federal agencies, professional societies, private foundations and more. COS Pivot’s advanced search tool can help faculty find opportunities relevant to their discipline, and its funding alert service can send a weekly email with newly listed search matches. Users can also set up research profiles and search for other researchers to facilitate off-campus collaboration.

Proposal development

After identifying relevant funding opportunities, faculty can consult the proposal development section for information on writing proposals. This section contains links to tips and guides as well as examples of proposals suitable for submission to a variety of agencies.

It is important to contact your academic unit’s [assigned coordinator](#) in the Office of Sponsored Programs (OSP) before beginning to write your proposal. OSP



staff can help avoid submission and eligibility problems by ensuring compliance with applicable university and sponsor policies.

Proposal submission

The proposal submission section provides an interactive walk-through of the process of submitting a proposal, including electronic routing, budget preparation and administrative review.

Questions? Contact OVPR

The Office of the Vice Provost for Research is dedicated to assisting faculty from all academic units in identifying, obtaining and managing the funding needed to support their research and scholarly pursuits.

If you have questions about seeking funding for your research or using the COS Pivot database, contact [Blake Thomas](#) at 254-710-3153.

CITI Training Spotlight

Considering research in a workplace setting? Review the optional CITI module on workers and employees

Federal and state laws, as well as university policies, afford protection to human subjects of research. Baylor University and its Institutional Review Board (IRB) share responsibility with investigators for implementing all required protections to safeguard the rights and welfare of subjects.

For faculty conducting research on workplace dynamics, it may be necessary to gather survey data from employees. It is important to remember that workers or employees are considered vulnerable research subjects because of the potential for coercion by an employer either to participate or not to participate in a study, or to answer in a way that casts the organization in a more favorable light.

Because of these vulnerabilities and risks, investigators

must carefully consider their research methods to ensure protection of employees who serve as research subjects (investigators who would like to survey Baylor employees must receive the approval of the appropriate vice president).

The CITI online training program offers a module dedicated to research on worker/employee populations. While the IRB does not require this module as part of mandatory human subjects training, it is helpful to those investigators considering research conducted in the workplace.

[Click here](#) to access the CITI training portal, or contact [Jill Combs](#), OVPR administrative assistant, with questions about CITI training.

New student organization supports undergraduate research

A new student organization dedicated to promoting research among undergraduates has received its official university charter.

Baylor Undergraduate Research in Science and Technology (BURST) is made up of students from a variety of STEM fields who share an interest in making research a part of their undergraduate experience.

The group was born out of the Undergraduate Research and Scholarly Achievement (URSA) program, an OVPR initiative that seeks to expand research opportunities for undergraduate students across all academic units.

Taylor Kohn, a junior university scholar major from Wichita, Kansas, is the president of BURST. He said the new organization will sponsor workshops and other events on campus to help students improve their

research skills and learn more about how to present findings of research.



“We’ll be bringing in speakers to talk about how hypothesis-driven research works,” he said. “We’ll have workshops on practical skills like how to make a research poster or how to write an abstract. Those skills are important, but sometimes overlooked in a traditional classroom setting.”

He said the group also plans to partner with URSA to help make students aware of opportunities for undergraduate research, both here at Baylor and off campus.

Kohn and other members of BURST will work closely with members of the Undergraduate Research and Scholarly Achievement (URSA) Steering Committee to prepare for and present next year’s URSA Scholars Week event.

URSA honors outstanding undergraduate research posters from 2012 Scholars Week event

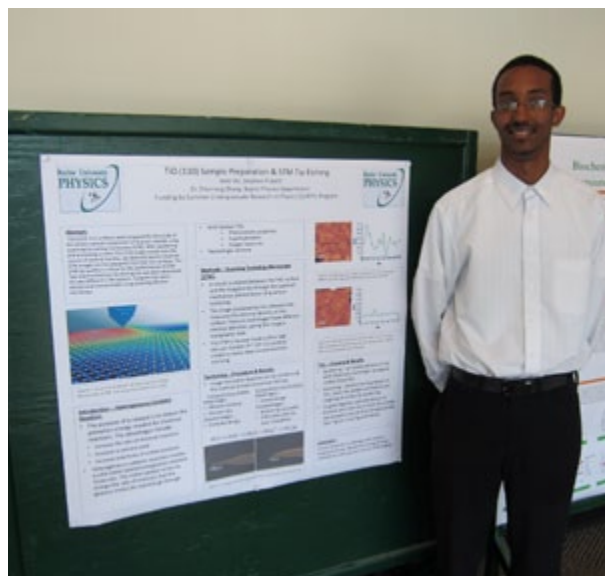
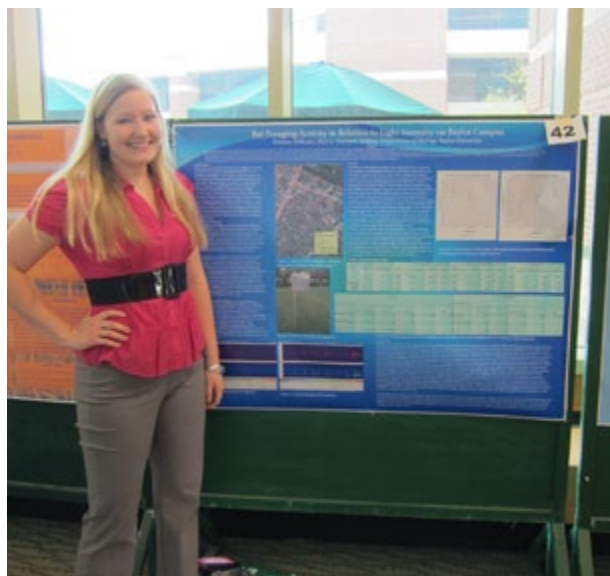
The 2012 edition of URSA Scholars Week showcased undergraduate research from academic units across the university. The Biology, Environmental Science, Geology and Physics departments have awarded special recognition to the top posters in their disciplines.

In all, the four departments recognized 12 “Outstanding Undergraduate Research Posters.”

In conjunction with URSA and the Baylor Libraries, BURST organized a public exhibition of these top

posters in the walkway between the Moody and Jones Libraries, giving students, faculty and other visitors a chance to see the outstanding work being done by our undergraduate students.

URSA and the OVPR are proud to recognize the students and faculty mentors who contributed to these outstanding posters. A full list of the 12 recognized posters, including titles, authors and faculty mentors, is available on the [URSA website](#).



Kristine Williams, left, and Amir Ali present the results of their research at the 2012 URSA Scholars Week. Williams’ and Ali’s posters were among the 12 “Outstanding Undergraduate Research Posters” recognized by faculty judges in their departments.

Federal Grants

Opportunity Title	Due Date
<u>NSF - Earth Sciences: Instrumentation and Facilities (EAR/IF)</u>	Continuous
<u>NSF - Research and Evaluation on Education in Science and Engineering (REESE)</u>	07/17/2012
<u>NSF - Science, Technology and Society</u>	08/01/2012
<u>NIH - Behavioral and Social Science Research on Understanding and Reducing Health Disparities (R21)</u>	08/14/2012
<u>NSF - Advancing Informal STEM Learning</u>	08/14/2012 (LOI)
<u>NEH - America's Historical and Cultural Organizations</u>	08/15/2012
* <u>NEH - Summer Stipends</u>	08/16/2012 (Internal LOI)
* <u>NIH - Academic-Community Partnership Conference Series (R13)</u>	10/17/2012
<u>NSF - Condensed Matter Physics</u>	10/31/2012

Foundation Grants

Opportunity Title	Due Date
<u>Mathers Foundation - Grants for Research in the Life Sciences</u>	Continuous
<u>Spencer Foundation - Organizational Learning in Schools, School Systems, and Higher Education Institutions</u>	Continuous
<u>William T. Grant Foundation - Investigator Initiated Grants (Youth Development)</u>	08/15/2012
<u>Lyndon Baines Johnson Foundation - Grant-in-Aid for Research</u>	09/15/2012
<u>Fund for Astrophysical Research - Grants for Research in Astronomy</u>	10/01/2012
<u>Templeton Foundation - The Meanings of Convergence: Exploring the Implications of Biological Convergence for a Deeper Understanding of Life and its History</u>	10/15/2012

* Limited-submission opportunity. [Click here](#) for application information

Search for funding with COS Pivot

The OVPR maintains a subscription to COS Pivot, a searchable database of funding opportunities in all academic areas. To search for funding in your discipline and receive email alerts with newly listed opportunities, [sign up with COS Pivot](#) today. If you have questions or would like training on using COS Pivot, contact [Blake Thomas](#) in the OVPR at 254-710-3153.

Ready to apply?

If you'd like to apply for these or other specific opportunities, contact your department's assigned [OSP coordinator](#).